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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/492,671	06/08/2012	Abbas JAMSHIDI-ROUDBARI	106842046820 (P12334USX1)	1527

69753 7590 01/25/2017

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EXAMINER	
OKEBATO, SAHLU	

ART UNIT	PAPER NUMBER
2625	

NOTIFICATION DATE	DELIVERY MODE
01/25/2017	ELECTRONIC

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ABBAS JAMSHIDI-ROUDBARI and SHIH CHANG CHANG

Appeal 2016-001244
Application 13/492,671
Technology Center 2600

Before ST. JOHN COURTENAY III, ERIC S. FRAHM, and JOYCE CRAIG, Administrative Patent Judges.

COURTENAY, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's Final Rejection of claims 1–16, which are all the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We Affirm.

Invention

The disclosed and claimed invention on appeal "relates generally to integrated touch screens that include common electrode portions that can be operated as drive lines and/or sense lines, and in particular, to high-resistivity connections between the common electrode portions." (Spec. ¶ 2).

Representative Claim

1. An integrated touch screen comprising:

a plurality of display pixels disposed in an active region of the touch screen;

a plurality of common electrodes, each display pixel being associated with one of the common electrodes;

[L] *a plurality of conductive connections between common electrodes configured to allow a charge to leak through the connections, each conductive connection including a normally-on device that has a first resistance when the touch screen is powered on and second resistance when the touch screen is powered off.*

(Bracketed lettering added and contested limitation L emphasized).

Rejections

A. Claims 1 and 12 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 13/312,940 in view of Treu et al. (US 2011/0227095 A1; pub. Sept. 22, 2011) hereinafter referenced as "Treu" (now US 8,530,904, iss. Sept. 10, 2013; therefore, this rejection is no longer provisional).

B. Claims 1–16 are rejected as being unpatentable over Hotelling et al. (US 2010/0194707 A1; pub. Aug. 5, 2010), hereinafter "**Hotelling-1**," in view of Hotelling et al. (US 2011/0050585 A1; pub. Mar. 3, 2011), hereinafter "**Hotelling-2**," and **Treu** (US 2011/0227095 A1).[1]

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[1] To prevent confusion, we have adopted herein the nomenclature of the Examiner (Final Act. 8) and Appellants (App. Br. 3) in referring to Hotelling '707 as "Hotelling-1" and Hotelling '585 as "Hotelling-2."

Grouping of Claims

We address nonstatutory double patenting rejection A separately, *infra*. Based on Appellants' arguments, we decide the appeal of rejection B of claims 1–16 on the basis of representative claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

ANALYSIS

Nonstatutory Double Patenting Rejection A

Appellants request that "the provisional nonstatutory double patenting rejection be held in abeyance until all of the other rejections have been overcome, upon which time [Appellants] will submit a terminal disclaimer to overcome the double patenting rejection, if necessary." (App. Br. 3).

Because Appellants advance no arguments on appeal traversing the nonstatutory double patenting rejection (that is no longer provisional), we *pro forma* sustain the Examiner's rejection A of claims 1 and 12 on the ground of non-statutory obviousness-type double patenting.

Rejection B of Representative Claim 1 under § 103

We have considered all of Appellants' arguments and any evidence presented. Appellants present the following principal contentions:

Appellants contest limitation L of claim 1:

> *a plurality of conductive connections between common electrodes configured to allow a charge to leak through the connections, each conductive connection including a normally-on device that has a first resistance when the touch screen is powered on and second resistance when the touch screen is powered off.*

(App. Br. 3).

Appellants also contest the similar limitation recited in claim 12:

> *a plurality of conductive connections between common electrodes, each conductive connection including a thin film transistor (TFT) that has a connection between two of the common electrodes and is configured to be in an off state when the touch screen is powered on.*

Appellants submit that none of the cited references teach these limitations. (App. Br. 3, 7). Appellants additionally contest the combinability of the references: "Furthermore, there would have been no motivation for one skilled in the art to combine the teachings of Hotelling-1, Hotelling-2, and Treu because the combination would be rendered inoperable." (*Id.*).

Contested Limitation L

In support of the argument regarding contested limitation L of claim 1, Appellants contend:

> Treu teaches a semiconductor device that uses a standard normally-on transistor. As described in paragraph [0023], Treu's normally-on transistor is *non-conductive* in an "off" state when a voltage is applied to the gate (e.g., device is powered on). One skilled in the art would understand that a non-conductive connection is configured to *prevent*, not allow, a charge from leaking through. Accordingly, the transistor in Treu cannot read on a "connection ... configured to *allow a charge to leak through* when the touch screen is *powered on*" (emphasis added), as required by the claims.

(App. Br. 4).

The Examiner (Final Act. 9–10) relies on Treu (¶ 23) to teach or suggest the claimed "normally-on device that has a first resistance when the touch screen is powered on and second resistance when the touch screen is powered off." (Claim 1).

Paragraph 23 of Treu describes:

> The term "normally-on" transistor used herein refers to a depletion mode transistor being in a conductive, i.e., "on" state when no voltage is applied to the gate and turns into a non-conductive, i.e., "off" state when a voltage is applied to the gate.

(Treu ¶ 23).

We give the contested claim 1 term "normally-on device" the broadest reasonable interpretation consistent with the Specification. *See In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). Turning to Appellants' Specification (¶ 72) for *context*, we find a "normally-on device" is described, as follows:

> A device with a characteristic curve such as 1901 can be a *normally-on device*, such as a *depletion-type transistor*, for example. A normally-on device can be on, i.e., *electrically conductive, when no voltage is applied to the device*. In order to switch off a normally-on device, a voltage can be applied to the device.

(Spec. ¶ 72) (emphasis added).

We find Appellants' aforementioned description (Spec. ¶ 72) of "a *normally-on device*, such as a *depletion-type transistor* . . . [that] can be on, i.e., *electrically conductive, when no voltage is applied to the device* [or] . . . switch[ed] off [when] a voltage [is] applied to the device" is **essentially identical** to Treu's description (¶ 23) of a "'normally-on' transistor [that] refers to a depletion mode transistor being in a conductive, i.e., 'on' state when no voltage is applied to the gate and turns into a non-conductive, i.e., 'off' state when a voltage is applied to the gate."

Thus, we find Appellants' argument regarding limitation L (App. Br. 4) **directly contradicts** Appellants' own supporting description of a "normally-on device" in the Specification (¶ 72). For at least this reason,

and based upon a preponderance of the evidence (Treu ¶ 23; Spec ¶ 72), we find Appellants' argument regarding contested limitation L is not persuasive.

We further find that **both** a *normally-on device* and a *normally-off device* (with both devices functioning essentially as switches, either *conducting* from source to drain (in an ON state), **or** presenting a high-impedance from source to drain (in a *non-conducting* OFF state)) would have *a first resistance* (from source to drain) when the touch screen is powered on and a *second resistance* (from source to drain) when the touch screen is powered off, assuming that powering on the touch screen responsively results in a control voltage being applied (or not applied) to the gate of the voltage-controlled device (TFT).

Combinability of the Cited References under §103

Appellants' argument regarding the combinability of the cited references is premised on bodily incorporating the "normally on" transistor described in Treu (¶ 23) into the Figure 4B circuit of Hotelling-2 (replacing TFT S3), without making necessary circuit accommodations to take into account the specific "polarity" or type (p-channel or n-channel) of TFT device.[2]

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[2] "It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements." *In re Mouttet*, 686 F. 3d 1322, 1332 (Fed. Cir. 2012) (citing *In re Keller*, 642 F.2d at 425) ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.")). Instead, the relevant issue is "what the combined teachings of the references would have suggested to those of ordinary skill in the art." *Id.* "Combining the teachings of

We note Appellants' claim 1 fails to positively recite any particular relationship between the touch screen being *powered on* and a gate voltage being responsively applied to control the "normally-on device." If we assume powering on the touch screen responsively causes a control voltage to be applied to the gate of a normally-on device (TFT), in order to *switch off* the normally-on device (corresponding to a high impedance or non-conductive state from source to drain), then we agree with Appellants' contention that physically "[r]eplacing Hotelling-2's transistor [S3, Fig. 4B] with Treu's normally-on transistor would prevent touch sensing capability in Hotelling-2 when the touch screen is powered on and render it inoperable." (App. Br. 4).

However, our agreement with Appellants on a single point of argument (App. Br. 4) does not conclude our inquiry regarding the ultimate question of whether claims 1 and 12 are obvious under § 103 over the cited combination of Hotelling-1, Hotelling-2, and Treu. We must also consider the Examiner's additional underlying factual findings, including the **level of ordinary skill in the art**, as relied upon to support the ultimate legal conclusion of obviousness.[3]

The Examiner finds and concludes:

> The combination of Hoteling-1 and Hotelling-2 does not specifically disclose each conductive connection including a

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references does not involve an ability to combine their specific structures." *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973).

[3] In determining the level of skill in the art, various factors may be considered, including "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made;

> normally-on device that has a first resistance when the touch screen is powered on and second resistance when the touch screen is powered off.
>
> However, normally-on devices are well known in the art. For example, Treu discloses an electrical characteristic of a normally-on device as a transistor (***[0023]*** **and normally-on transistor 110, fig. 1; wherein "normally-on" transistor used herein refers to a depletion mode transistor being in a conductive, i.e., "on" state when no voltage is applied to the gate and turns into a non-conductive, i.e., "off" state when a voltage is applied to the gate so in each state the transistor has different resistance**).
>
> Therefore, **one of ordinary skill in the art at the time** of the invention was made would have substitute[d] Hotelling-2's transistor with Treu's normally-on transistors, and the result of the substitution would have resulted [in a] high/low resistivity connection depending on power [being] appl[ied] or not to the normally-on transistor and would have resulted using the display in multiple functionality modes.

(Final Act. 9–10).

In reviewing the record, we find Treu (¶¶ 20, 23) evidences it would have been well within the level of skill of a person having ordinary skill in the art to have understood the source and drain of a TFT are interchangeable, *with appropriate circuit modifications* to accommodate either a p-channel device or an n-channel device, as associated with either a "normally-on

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sophistication of the technology; and educational level of active workers in the field." *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)).

device" (claim 1) or a normally-off device.[4] Our reviewing court provides applicable guidance:

> [i]f the only facts of record pertaining to the level of skill in the art are found within the prior art of record, the court has held that an invention may be held to have been obvious without a specific finding of a particular level of skill where the prior art itself reflects an appropriate level. *Chore-Time Equipment, Inc. v. Cumberland Corp.*, 713 F.2d 774, 218 USPQ 673 (Fed. Cir. 1983). See also *Okajima v. Bourdeau*, 261 F.3d 1350, 1355, 59 USPQ2d 1795, 1797 (Fed. Cir. 2001).

Manual of Patent Examining Procedure (MPEP) § 2141.03(II) (9th Ed., Mar. 2014).

Applying this guidance here, we find Appellants' arguments regarding *inoperability* do not fully address the Examiner's specific findings. (Final Act. 9–10, 13–14). To the extent that alternative circuit "logic" would have been required to implement an *operable* circuit if a "normally on" transistor (as described in Treu ¶ 23) was incorporated into the Figure 4B circuit in Hotelling-2 (replacing transistor S3), we find paragraph 20 of Treu evidences such necessary "inverted" logic would have been *well within the level of ordinary skill of an artisan* (emphasis added):

> One terminal 125 of a source/drain of the normally- off transistor 105 is electrically coupled to a gate terminal 131 of the normally-on transistor 110, the other terminal 127 of the source/drain of the normally-off transistor 105 is electrically coupled to one terminal 130 of a source/drain of the normally-on transistor 110.

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[4] "Every patent application and reference relies to some extent upon knowledge of persons skilled in the art to complement that [which is] disclosed. . . ." *In re Bode*, 550 F.2d 656, 660 (CCPA 1977) (quoting *In re Wiggins*, 488 F.2d 538, 543 (CCPA 1973)). Those persons "must be presumed to know something" about the art "apart from what the references disclose." *In re Jacoby*, 309 F.2d 513, 516 (CCPA 1962).

> The second semiconductor die 120 furthermore includes a gate resistor 135 electrically coupled between the gate terminal 131 of the normally-off transistor 110 and respective gates 134 of the plurality of transistor cells of normally-on transistor 110. *As an example, the one terminals 125, 130* **may be source terminals** *in case transistors 105, 110 are* **n-channel transistors**. *As a further example, the one terminals 125, 130* **may be drain terminals** *in case transistors 105, 110 are* **p-channel transistors.** *As yet another example, the* **one terminal 125 may be a drain terminal and the one terminal 130 may be a source terminal in case transistor 105 is a p-channel transistor** *and transistor 110 is an n-channel transistor. The* **one terminal 125 may also be a source terminal and the one terminal 130 may be a drain terminal in case transistor 105 is an n-channel transistor** *and transistor 110 is a p-channel transistor.*

(Treu ¶ 20) (emphasis added).

Buttressing the Examiner's findings (Final Act. 9–10), we also find the required circuit modifications would have been well within the ordinary level of skill of an artisan, because there are *only two arrangements* regarding the respective "polarities" of the source and drain of a TFT in a circuit.[5]

Our reviewing court guides: Where "the problem is known, the possible approaches to solving the problem are known and finite, and the solution is predictable through use of a known option," a solution that is obvious to try may indeed be obvious. *Abbott Labs. v. Sandoz, Inc.*, 544

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[5] "The person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant prior art." *In re GPAC*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citing *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). As noted above, the level of ordinary skill in the art is reflected by the prior art of record (e.g., Treu ¶¶ 20, 23).

F.3d 1341, 1351 (Fed. Cir. 2008), citing *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007). *See also Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1364 (stating the number of options must be "small or easily traversed").

Here, because there are only *two arrangements* regarding the respective "polarities" of the source and drain of a switching TFT device, and because we find an artisan would have known how to accommodate the respective circuit arrangements (Treu ¶20), we conclude the Examiner's proffered substitution would have been "obvious to try." Further, given the evidence provided by the Examiner (e.g., Treu ¶ 23; Final Act. 9), we find any required "inverted" circuit logic to implement such change to provide an **operable circuit** would have been **well within the level of ordinary skill of an artisan at the time of Appellants' invention.** *See e.g.*, Treu ¶ 20.

On this record, we find an artisan possessing an ordinary level of skill in the art would have been able to accommodate the requisite circuit modifications by using *known methods* (Treu ¶ 20) to realize a predictable result, i.e., **an operable circuit**.[6]

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[6] The conclusion of obviousness can be based on the interrelated teachings of multiple patents and the background knowledge possessed by a person having ordinary skill in the art. An obviousness "analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." The Supreme Court has determined the conclusion of obviousness can be based on the interrelated teachings of multiple patents, the effects of demands known to the design community or present in the marketplace, *and the background knowledge possessed by a person having ordinary skill in the art. KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

We do not find persuasive Appellants additional contentions that Hotelling-1 and Hotelling-2 are incompatible (regarding claim 12) because the proffered combination "would only add extra components or parts." (App. Br. 6–7). We find both Hotelling-1 and Hotelling-2 share common inventors and are each directed to analogous art (e.g., sharing the title "Integrated Touch Screen").[7] Moreover, inventor Shih Chang Chang (a named inventor of record in this instant appeal) appears to be the same Shih Chang Chang inventor of record, as listed in Hotelling-1 and Hotelling-2. [8]

Therefore, on this record, and by a preponderance of the evidence, we are not persuaded the Examiner erred: (1) by concluding the contested "normally-on device" of Treu (¶ 23) (corresponding to the "normally-on device" recited in claim 1) would have been *an obvious modification* of Hotelling-1 and Hotelling-2 *to an artisan possessing an ordinary level of skill in the art*, or (2) by improperly combining the cited references under 35 U.S.C. § 103.

Accordingly, we sustain the Examiner's rejection B of representative claim 1, and rejection B of independent claim 12 for essentially the same

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[7] *Cf.* with Title and subject matter of the instant invention on appeal: "COMMON ELECTRODE CONNECTIONS IN **INTEGRATED TOUCH SCREENS**"

[8] Prior art is analogous where: 1) the prior art is from the same field of endeavor as the claimed invention; or 2) is "reasonably pertinent" to the problem faced by the inventor. (*In re Bigio*, 381 F.3d 1320, 1325–26 (Fed. Cir. 2004). To be "reasonably pertinent," art must "logically commend itself" to an inventor's attention in considering his problem. *In re Icon Health and Fitness, Inc.*, 496 F.3d 1374, 1379–80 (Fed. Cir. 2007)(*citing In re Clay*, 966 F.2d 656, 658-59 (Fed. Cir. 1992)). *See also* MPEP § 2141.01(a).

reasons articulated by the Examiner (Final Act. 9–10), as further discussed above. The remaining claims rejected under rejection B (not separately argued), fall with representative claim 1. *See* "Grouping of Claims" *supra*.

DECISION

We affirm the Examiner's decision rejecting claims 1 and 12 on the ground of nonstatutory obviousness-type double patenting.

We affirm the Examiner's decision rejecting claims 1–16 under 35 U.S.C § 103(a).

No time for taking any action connected with this appeal may be extended under 37 C.F.R. § 1.136(a)(1). *See* 37 C.F.R. § 41.50(f).

AFFIRMED